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THREE NEW SPECIES OF THE BENTHO-PELAGIC FISH GENUS *PLAGIOGENEION* FROM THE SOUTHERN PACIFIC AND INDIAN OCEANS (TELEOSTEI: EMMELICHTHYIDAE)

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Abstract.—*Plagiogeneion geminatum,* described from eight specimens from a seamount on the Nazca submarine ridge in the southeastern Pacific at 200 m, is most similar to *P. rubiginosum,* but differs in having more transverse scales (37–39 vs. 29–34), and a slightly shorter pectoral fin and upper jaw. *Plagiogeneion unispina,* described from five specimens from a seamount of the Sala y Gomez submarine ridge at 280–310 m, and *P. fiolenti,* described from 35 specimens from Walters Shoals in the southwestern Indian Ocean at 180–300 m, are distinct from other congeners in having only the lower opercular spine sharp and a more slender body. The former has more lateral line and transverse scales than *P. fiolenti* (67–73 vs. 60–70; 29–31 vs. 31–33).

According to the revision of the Emmelichthyidae by Heemstra & Randall (1977), the genus *Plagiogeneion* Forbes includes two species, *P. rubiginosum* (Hutton) known from New Zealand (type locality), southeastern Australia, St. Paul and Amsterdam Islands, South Africa and Vema Seamount, and *P. macrolepis* McCulloch with very restricted distribution in the Great Australian Bight. These two species are easily recognized by the number of lateral-line scales (67–74 in *P. rubiginosum* vs. 48–51 in *P. macrolepis*). According to Eschmeyer (1990: 317), the generic name *Plagiogeneion* is neuter so the ending of the adjectival species name *rubiginosus* must be modified to *rubiginosum.*

When taking part in an expedition to the southeast Pacific in 1984, I collected five emmelichthyids that were identified, using the key in Heemstra & Randall (1977), as *P. rubiginosum.* In 1986 I. I. Konovalenko, a fishery biologist with the AtlantNIRO Fisheries Institute (Kaliningrad, USSR), obtained from the same general area another eight specimens also referable to *P. rubiginosum* using Heemstra and Randall's key, but evidently different from the specimens in the first collection. When comparing this material with other available specimens of *Plagiogeneion,* I found that three specimens from Walters Shoals, a seamount in the southwestern Indian Ocean also did not fit all characters of *P. rubiginosum.* In 1988, numerous additional specimens of the West Indian Ocean species were collected at Walters Shoals during the R/V *Vityaz* expedition (Collette & Parin 1991). Having very limited material of *Plaigiogeneion* from other than the localities mentioned, I have decided not to try to revise the genus at this time but to simply describe the three apparently new species.

Materials and methods.—Material of the three new species is listed in the species accounts. For comparisons, data on 31 specimens of *P. rubiginosum* received from P. Heemstra were used (counts and measurements of 18 specimens, 91–442 mm SL from New Zealand and New South Wales, 7 specimens, 235–350 mm from off South Africa, and 6 specimens, 120–189 mm from St. Paul and Amsterdam Is.). Additional material examined by me include a *P. rubiginosum*

(246 mm SL) from the Tasman Sea (37°42′S, 167°40′E; ZIN 49828), 1 (178 mm) from South Africa (37°42′S, 17°23′E; ZIN 48829) and 1 (108 mm) from Walters Shoals (33°05′S, 43° 42′E; ZIN 49830) and 1 specimen of *P. macrolepis* (198 mm; 33°16′S, 129°04′E; ZIN 38591). Not being convinced that the "*P. rubiginosum*" from New Zealand–Australia, St. Paul–Amsterdam and South Africa are conspecific (all are deep-bodied but differ in pectoral fin length, number of pectoral rays and scales between dorsal-fin origin and lateral line; see Tables 1, 2), I compare the three new species with each of these allopatric populations.

Measurements and counts were made as indicated in Heemstra & Randall (1977). Number of "scales in oblique transverse row" means the sum of scales between the middle of the spinous dorsal fin and the lateral line plus the lateral line scale plus the scales between the lateral line and anal fin origin. Counts of bilateral elements were made on both sides of the body.

In the species descriptions, characters of the paratypes (when different from the holotype) are given in parentheses. Type specimens are deposited in Zoological Institute, Leningrad (ZIN) (including all holotypes), Australian Museum, Sydney (AMS), Los Angeles County Museum (LACM), National Museum of Natural History, Washington, D.C. (USNM), J.L.B. Smith Institute of Ichthyology, Grahamstown (RUSI) and Zoological Museum of Moscow University (ZMMU). SL denotes standard length; HL, head length.

Plagiogeneion geminatum,
new species
Fig. 1a

Types.—Holotype: ZIN 49821, 270 mm SL, male; southeastern Pacific, Nazca Ridge, 22°05′S, 81°14′W; commercial pelagic trawl at 200 m; I. I. Konovalenko; 11 Nov 1985.

Paratypes.—ZIN 49822 (3, 262–280), USNM 316518 (1, 266); RUSI 35612 (1, 250); ZMMU 18276 (2, 253–257)—same data as holotype.

Diagnosis.—Body depth 30–33% SL; body width 16–18.5% SL; pectoral-fin length 27–28% SL, both opercular spines sharp; 37–39 scales in oblique transverse row; 69–74 scales in lateral line; pectoral-fin rays 20–21; upper-jaw length 40–42% HL, maxilla width 16–17.5% HL; teeth present on vomer and palatines.

Description.—Counts and measurements are summarized in Tables 2 and 3.

Body depth 3.3 (3.0–3.3), head length 3.5 (3.4–3.6) times in SL. Body depth/width = 1.7 (1.8–2.0). Scales strongly ctenoid, 11 (11–12) between middle dorsal spines and lateral line and 26 (25–26) between the latter and anal fin origin. Pectoral fin long, almost equal to head length. Bony orbit 3.4 (3.1–3.4) times in head length, eye diameter almost equal to interorbital width. Snout length a little less than interorbital width. Upper jaw length/width = 2.5 (2.3–2.5). Ventral edge of preorbital bone finely serrate. Posterior edge of opercle with two sharp and rather strong spines. Narrow band of small sharp teeth at front of both jaws; vomer and palatines with a few small sharp teeth. Gill rakers 12 + 30 (11–13 + 28–31). Pyloric caeca 9–10. Caudal peduncle depth/width = 1.8 (1.7–2.0). Scales around caudal peduncle 35 (35–37).

Color when fresh unknown.

Comparisons.—Most similar to *P. rubiginosum* populations from the type locality (New Zealand) in body proportions and meristics but differs from this species in smaller and more numerous scales along the dorsal and ventral edges of body; as a result the total number of transverse scales is greater in *P. geminatum* (37–39, $\bar{X}$ 37.75 vs. 29–34, $\bar{X}$ 31.42). Also, pectoral fin and upper jaw are slightly shorter in *P. geminatum* than in *P. rubiginosum* from New Zealand and Australia.

Other species of *Plagiogeneion* (including "*P. rubiginosum*" from South Africa and St. Paul–Amsterdam) have shorter pectoral fins

Table 1.—Selected proportional characters of *Plagiogeneion rubiginosus* from different localities (based on data presented by P. Heemstra and examined specimens).

	New Zealand and Australia	South Africa	St. Paul and Amsterdam Ids.
Standard length, mm	91–442	108–350	120–189
Greatest depth of body, % SL	31.0–35.5	30.8–34.8	30.7–32.3
Pectoral fin length, % SL	28.0–30.6	21.6–27.2	23.5–25.6
Maxillary width, % HL	41.6–46.8	43.3–45.9	40.4–44.5

(less than 27% SL). Also, *P. unispina* and *P. fiolenti* have more elongate bodies (depth 28.5–30% SL), no vomerine or palatine teeth, and only one (lower) opercular spine well developed (in both these the upper one is rounded or indistinct). *Plagiogeneion macrolepis* has many fewer lateral-line scales (48–52).

Etymology.—Named for its close similarity to its geminate congener, *P. rubiginosum.*

Distribution.—Known only from a single seamount of the Nazca submarine ridge in the southeast Pacific at 200 m depth.

Plagiogeneion unispina,
new species
Fig. 1b

Types.—Holotype: ZIN 49823, 239 mm SL, male: 25°58′S, 100°36′W; bottom otter trawl; depth 310–290–300 m; N. V. Parin and Y. P. Pavlov; 5 Oct 1984.

Paratypes.—ZIN 49824 (2, 152–236); USNM 316517 (1, 178); RUSI 35613 (1, 173)—same data as holotype. Paratypes, especially both ZIN specimens, are in poor condition because the trawl was badly damaged and the specimens spent 5 days in twisted scraps of the net before their discovery and preservation.

Diagnosis.—Body depth 28–30% SL; body width 13–15% SL; pectoral-fin length 24–26.5% SL; only lower opercular spine sharp; 67–73 scales in lateral line; 29–31 scales in oblique transverse row; pectoral-fin rays 21–23; upper jaw length 39–40.5% HL, maxilla width 13–15% HL; no teeth on vomer or palatines.

Description.—Counts and measurements are summarized in Tables 2 and 3.

Body depth 3.4 (3.4–3.5, 3.9 in smallest paratype 152 mm SL), head length 3.5 (3.3–3.6) times in SL. Body depth/width = 2.0 (1.9–2.2) . Scales feebly ctenoid, 9 left and 8 right (8–9) between middle dorsal spines and lateral line and 20 (19–21) between the latter and anal fin origin. Pectoral fins shorter than head length. Bony orbit 3.3 (2.8–3.1) times in head length, eye diameter approximately equal to interorbital width. Snout length a little less than interorbital width. Upper-jaw length/width = 2.6 (2.6–2.7). Ventral edge of preorbital bone finely serrate. Posterior edge of opercle with rounded (rounded or obtuse) upper projection and sharp spine below. Narrow band of 2–3 rows of small teeth at front of both jaws; vomerine and palatine teeth absent. Gill rakers 12 + 28 (9–12 + 27–29). Pyloric caeca 11. Caudal peduncle depth/width = 2.4 (2.1–2.4). Scales around caudal peduncle 30 (30–31).

Color of fresh holotype: body and fins uniformly red, tips of caudal fin black.

Comparisons.—Resembles *P. fiolenti* in many characters including unequal development of opercular spines, slender body depth, and short pectoral fins. These species can be distinguished by number of lateral-line scales (67–73, $\bar{X}$ 69.6 in *P. unispina* vs. 60–70, $\bar{X}$ 66.0 in *P. fiolenti*), and transverse scales (29–31 vs. 31–33), by maxilla width (13–15 vs. 14.5–16.5% HL) and indices of

Table 2.—Meristics of *Plagiogeneion rubiginosus, P. geminatus, P. unispina* and *P. fiolenti.*

	Fin rays													
	Pectoral					Dorsal					Anal			
	19	20	21	22	23	XII	XIII	10	11	12	III	9	10	11
P. rubiginosus														
Australia–New Zealand	—	16	17	1	—	18	1	3	15	1	19	—	19	—
South Africa	6	8	2	—	—	9	—	1	8	—	9	—	8	1
St. Paul–Amsterdam	—	—	5	6	—	6	—	—	6	—	6	—	6	—
P. geminatus	—	11	5*	—	—	8*	—	—	8*	—	8*	—	8*	—
P. unispina	—	—	1	8*	1	5*	—	—	5*	—	5*	—	5*	—
P. fiolenti	—	23*	40*	7	—	34*	1	4	31*	—	35*	2	32*	1

	Lateral line scales														
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
P. rubiginosus															
Australia–New Zealand	—	—	—	—	—	—	—	1	2	1	9	2	2	1	2
South Africa	—	—	—	—	—	—	1	2	4	—	1	2	1	—	—
St. Paul–Amsterdam	—	—	—	—	—	—	—	1	1	—	—	2	2	—	—
P. geminatus	—	—	—	—	—	—	—	—	—	1	4*	4	4*	2	1
P. unispina	—	—	—	—	—	—	—	2*	—	3*	1	1	2	1	—
P. fiolenti	1	1	1	3*	7*	11	8	8	8	5	1	—	—	—	—

	Scales D/LL						Scales LL/A							
	7	8	9	10	11	12	19	20	21	22	23	24	25	26
P. rubiginosus														
Australia–New Zealand	1	8	9	—	2	—	—	—	3	3	6	1	—	—
South Africa	—	—	1	8	2	2	—	—	—	1	3	3	—	—
St. Paul–Amsterdam	—	3	2	—	—	—	—	—	—	1	—	—	—	—
P. geminatus	—	—	—	—	13*	3	—	—	—	—	—	—	5	11*
P. unispina	—	6	4*	—	—	—	1	8*	1	—	—	—	—	—
P. fiolenti	—	—	9*	57	4	—	—	4	30*	36	—	—	—	—

Table 2.—Continued.

	Fin rays																								
	Pectoral					Dorsal								Anal											
	19	20	21	22	23	XII	XIII	10	11	12	III	9	10	11	Circumpeduncle scales						Gill rakers				
															30	31	32	33	34	35	36	37	38	39	40	41	42	43
P. rubiginosus																												
Australia–New Zealand	—	5	7	4	1	—	—	—	—	3	3	6	6	1	2													
South Africa	—	1	2	1	—	1	—	—	1	1	3	1	—	—	—													
St. Paul–Amsterdam	—	1	2	2	—	—	—	—	1	1	2	—	1	—	—													
P. geminatus	—	—	—	—	—	3*	3	2	—	—	—	1	1	5*	1													
P. unispina	3*	2	—	—	—	—	—	—	—	3	5	2*	—	—	—													
P. fiolenti	8	19*	7	1	—	—	—	—	6	8	15	4	2*	—	—													

For *P. rubiginosus* data of P. Heemstra are included. Characters of the holotypes marked by an asterisk.

body compression (body depth/width 1.9–2.2 vs. 1.6–1.8, peduncle depth/width 2.1–2.4 vs. 1.8–2.0). The apparent differences in body depth may be due to the poor condition of the paratypes.

Other species of the genus differ from *P. unispina* in deeper body, narrower maxilla and opercular spines equally developed. Also, *P. rubiginosum* from New Zealand–Australia and *P. geminatum* have longer pectoral fins (28–30.5 and 27–28% SL).

Etymology.—The name refers to one of the most important diagnostic features of the species (presence of a single sharp spine on opercle).

Distribution.—All specimens were collected in the same trawl taken at a seamount on the western part of the Sala y Gomez submarine ridge at 280–310 m depth.

Plagiogeneion fiolenti,
new species
Figs. 1c, 2a

Types.—Holotype: ZIN 49825, 270 mm SL, male; near Walters Shoals; commercial pelagic trawl at about 250 m; A. S. Piotrovsky; 28 Jul 1984 (R/V *Fiolent,* Sta. 44).

Paratypes.—ZIN 49826 (2, 200–205)—same data as holotype. ZIN 49827 (5, 158–206); 33°07′S, 43°51′E; bottom shrimp-trawl at 240–300 m; 24 Dec 1988 (R/V *Vityaz,* Sta. 2767). ZMMU 18277 (14, 127–170); 33°08′S, 43°51′E; bottom shrimp-trawl at 180–300 (700) m; 24 Dec 1988 (R/V *Vityaz,* Sta. 2768). USNM 307758 (2, 160–164), LACM 44784-1 (2, 250–152), and AMS uncat. and RUSI uncat. (9, 131–166)—same data as ZMMU 18277.

Non-types—ZMMU 18278 (8, 112–232); 34°57′S, 81°10′E; commercial pelagic trawl at 230 m; 6 Jul 1988 (R/V *Fiolent,* no sta. number).

Diagnosis.—Body depth 28–30% SL; body width 16–19.5% SL pectoral fin 24–26.5% SL; only lower opercle spine sharp; 60–70 (usually 64–68) scales in lateral line; 31–33 scales in oblique transverse row; pectoral-

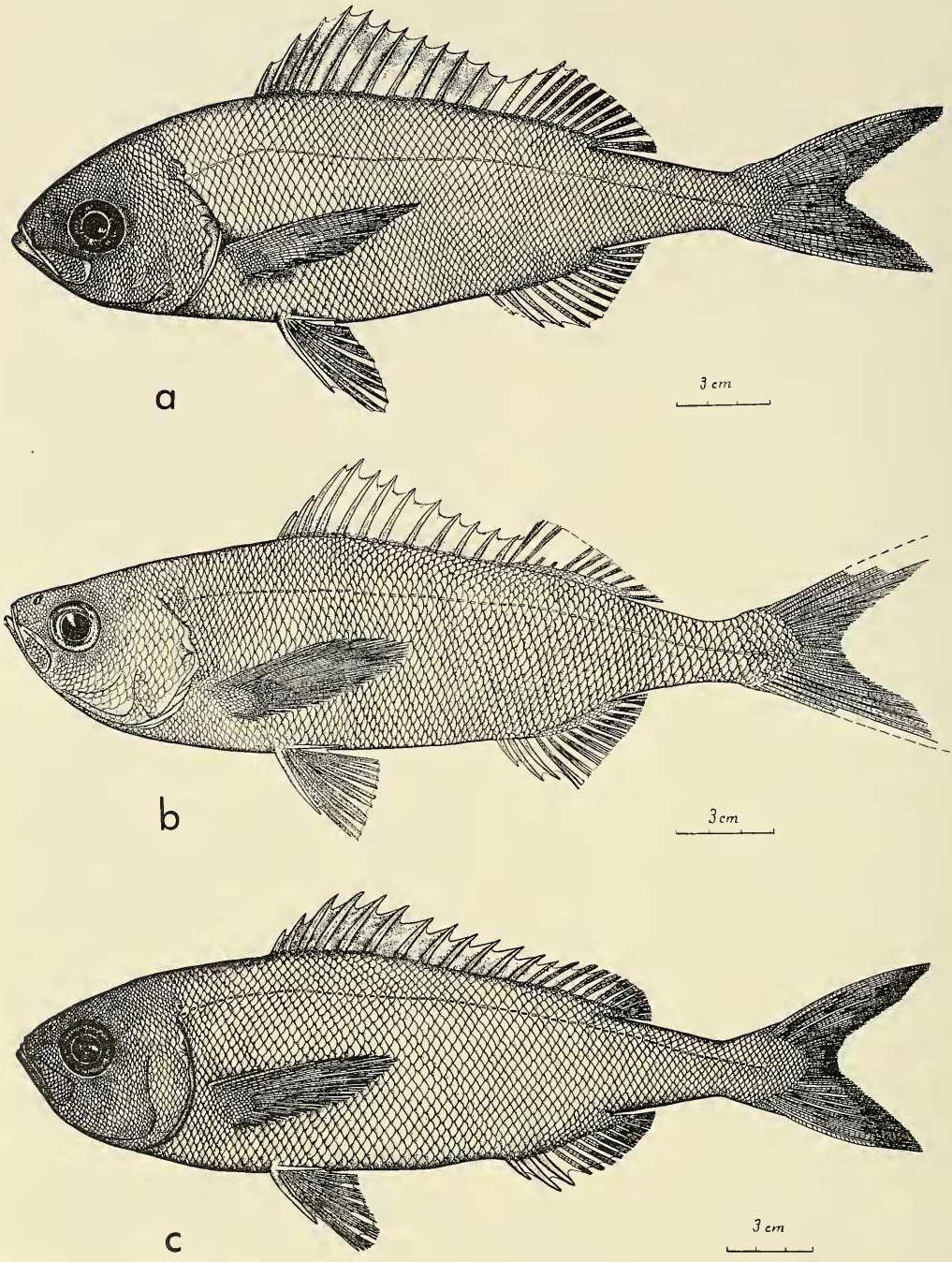

Fig. 1a. *Plagiogeneion geminatum* sp. n., holotype, ZIN 49821, 270 mm SL. b. *Plagiogeneion unispina* sp. n., holotype, ZIN 49823, 239 mm SL. c. *Plagiogeneion fiolenti* sp. n., holotype, ZIN 49825, 270 mm SL.

Table 3.—Proportional measurements of *Plagiogeneion geminatus, P. unispina* and *P. fiolenti.*

	P. geminatus		*P. unispina*		*P. fiolenti*	
	Holotype	7 paratypes	Holotype	4 paratypes	Holotype	12 paratypes
Standard length, mm	270	251–280	239	152–236	270	149–206
In percentage of SL:						
Greatest body depth	30.8	30.4–33.1	29.2	28.3[1]–29.8	28.9	28.3–30.0
Greatest body width	16.8	16.2–18.5	14.4	13.0–14.9	17.8	16.1–19.5
Head length	28.5	18.4–29.7	28.5	27.6–30.2	27.2	30.3–33.3[2]↓
Eye diameter	7.8	7.9–8.6	7.4	8.1–9.9 ↓	7.9	9.7–13.4 ↓
Orbit diameter	8.5	8.7–9.3	8.5	8.9–10.5↓	9.0	10.9–14.1 ↓
Interorbital width	8.2	7.9–8.4	7.9	8.1–8.7	9.6	8.8–9.5 ↑
Upper jaw length	11.9	11.7–12.2	10.5	10.7–11.8	11.5	11.6–14.1
Upper jaw width	4.7	4.7–5.0	4.0	3.9–4.6	4.6	4.6–5.3
Predorsal distance	37.4	37.4–38.6	37.2	38.8–39.7	36.3	37.6–41.0 ↓
Distance snout to anus	64.0	64.0–66.9	67.5	63.2–65.7	64.4	63.6–67.8
Spinous dorsal fin base	30.8	30.4–32.6	28.7	28.3–31.3	28.3	28.6–30.3
Pectoral fin length	27.8	27.2–28.2	24.1	24.1–26.3	25.6	23.9–26.6
Pelvic fin length	18.2	17.4–19.2	18.0	18.5–20.6	16.1	16.4–18.7 ↓
Anal fin length	22.6	22.0–23.8	22.6	22.0–22.8	20.6	20.5–23.8
Caudal fin length	32.6	30.4–34.4	30.1	27.9–28.7	—	29.0–33.0
Caudal peduncle depth	8.0	7.8–8.4	8.2	7.8–8.2	7.4	7.4–8.0
Caudal peduncle width	4.4	4.0–4.8	3.4	3.3–4.0	3.9	3.7–4.4
Longest dorsal fin spine	15.2	13.5–16.0	12.8	13.4–15.8	10.7	10.9–13.7
Penultimate dorsal spine	7.8	7.1–8.0	7.5	8.4–8.7	6.5	5.7–6.3
Last dorsal fin spine	6.7	7.5–8.5	—	7.5–9.8	6.3	5.1–7.4
First anal fin spine	—	4.9–5.8	5.2	5.1–5.9	4.1	4.4–5.8
Third anal fin spine	9.2	8.5–9.4	—	8.7–9.5	8.3	7.6–9.3
Distance ventral fin to anus	9.9	9.2–11.2	10.9	7.0–10.3	11.9	7.0–11.5 ↑

[1] 25.6 in the paratype 152 mm SL; [2] ↓ and ↑ — proportion decreases or increases with increasing SL.

fin rays 20–22; upper-jaw length 40–42.5% HL, maxilla width 14.5–16.5% HL; no teeth on vomer or palatines.

Description.—Counts and measurements are summarized in Tables 2 and 3.

Body depth 3.5 (3.3–3.5), head length 3.7 (3.0–3.3) times in SL. Body depth/width = 1.6 (1.6–1.8). Scales feebly ctenoid, 9 (8–10) between middle dorsal spines and lateral line and 21 (20–22) between the latter and anal fin origin. Pectoral fins shorter than head length. Bony orbit 3.0 (2.3–2.8) in head length, eye diameter less than interorbital width (equal to interorbital width in two paratypes 200 and 205 mm SL). Snout length less than interorbital width. Upper jaw length/width = 2.5 (2.4–2.8). Ventral edge of preorbital bone finely serrate. Posterior edge of operculum with rounded (rounded or obtuse) upper projection and sharp spine below. Narrow band of small teeth at front of both jaws; vomerine and palatine teeth absent. Gill rakers 13 + 28 (11–13 + 26–28). Pyloric caeca 10–13 in 6 paratypes. Caudal peduncle depth/width 1.6 (1.6–1.8). Scales around caudal peduncle 31 (30–33).

Color of freshly collected *Vityaz* paratypes (color photograph taken immediately after capture is published in Collette & Parin, 1991: pl. Ig): body and head reddish pink dorsally becoming silvery laterally and ventrally; pectoral and caudal fins pink, the latter with blackish tips; other fins almost transparent. Holotype and *Fiolent* paratypes "reddish green" as reported by the collector; in alcohol these are much darker than any other *Plagiogeneion* examined.

Remarks.—Differences between the holotype and paratypes in head length, orbit and eye diameter, and interorbital width

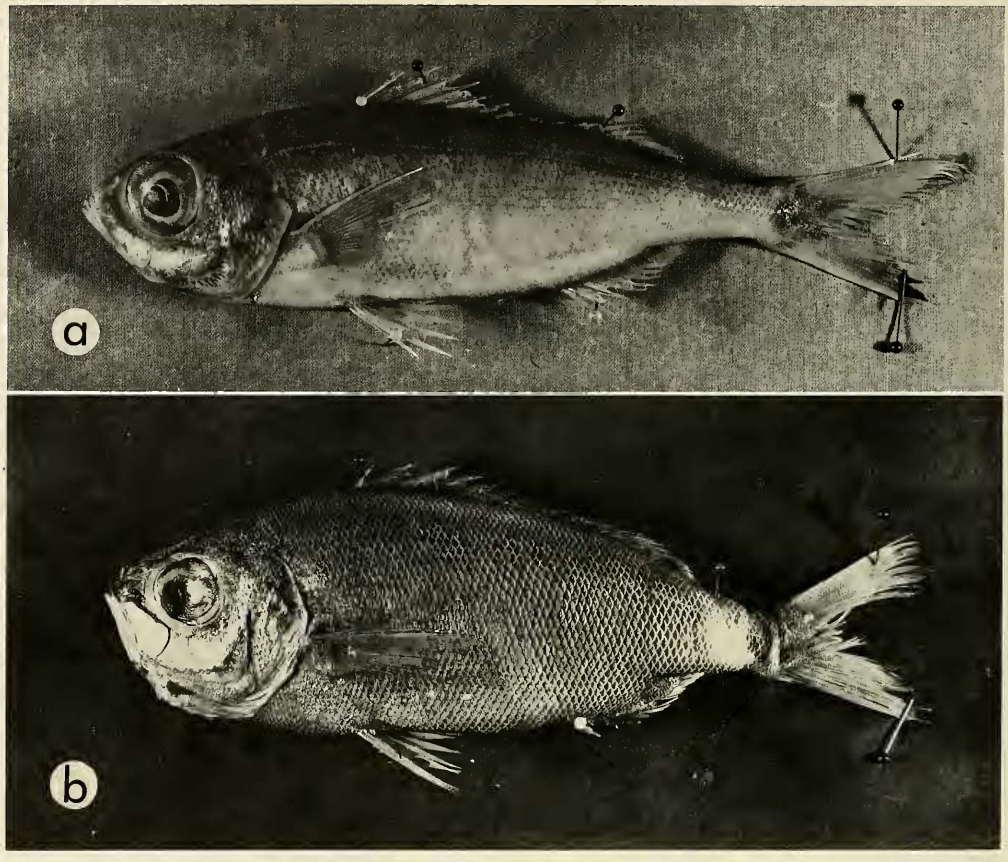

Fig. 2. Similar sized subadult specimens of *Plagiogeneion fiolenti* (185 mm SL, a) and South African *P. rubiginosum* (178 mm SL, b).

(Table 3) are apparently connected with allometric growth.

Non-type specimens collected at an unnamed seamount of the East Indian Ridge do not differ from the type-series in any character and are considered conspecific.

Comparisons.—The characters distinguishing *P. fiolenti* from the most similar species, *P. unispina,* are considered in the latter species account.

Other congeners have a deeper body, two sharp opercular spines, and different ranges of numbers of lateral-line scales (48–51 in *P. macrolepis,* 67–74 in all others).

Distributions of *P. fiolenti* and South African "*P. rubiginosum*" seem to overlap as one specimen 108 mm SL (ZIN 49830) recently collected at Walters Shoals (trawling depth 870–880 m) has all diagnostic characters of the latter (greatest body depth 33.3% SL, pectoral-fin length 21.6% SL, P 20/20, lateral-line scales 68/70, scales between the middle of spinous dorsal fin and lateral line 12). Distinctions between similar sized specimens of the two mentioned forms in general appearance are evident from Fig. 2.

Etymology.—Named for the R/V *Fiolent* from which the holotype and two paratypes were collected in 1984.

Distribution.—Known from the vicinities of Walters Shoals, an isolated submarine seamount in the southwestern Indian Ocean (about 400 miles south of Madagascar), and

from another seamount located at the same latitude but in the eastern Indian Ocean (34°57′S, 81°10′E). It is likely that the record of *P. rubiginosum* from the unnamed seamount east of Walters Shoals (34°54′S, 53°14′E; Duhamel, 1984) also refers to *P. fiolenti.*

Acknowledgments

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